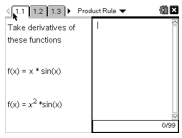
37. $\perp$ to $y = x^3 - 3x + 1$ at $(2, 3)$

Sep 16-9:26 AM

3.3b Rules for Differentiation

Use Product Rule.tns to discover the rule for taking derivatives of products of functions.



$y = x^2 \sin x$

mistake: $y' = 2x \cos x$

$y' = 2x \cdot \sin x + \cos x \cdot x^2$

$\frac{d}{dx}(uv) = u\frac{dv}{dx} + v\frac{du}{dx}$

$\frac{d}{dx}(uv) = uv' + vu'$

Sep 11-10:09 PM

Take the derivative of $y = (x^2 + 1)(x^3 + 3)$ don't simplify

$y' = (x^2+1)3x^2 + 2x(x^3+3)$

Sep 11-10:12 PM

The Quotient Rule

$\left[\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}\right]$

Differentiate $f(x) = \frac{x^2 - 1}{x^2 + 1}$

$f'(x) = \frac{(x^2+1)2x - (x^2-1)2x}{(x^2+1)^2}$

Sep 11-10:13 PM

Power rule for negative integer powers of *x*

$$\frac{d}{dx}\left(\frac{1}{x}\right) = \frac{x\cdot 0 - 1\cdot 1}{x^2} = -\frac{1}{x^2}$$

$$\frac{d}{dx}\left(x^{-1}\right) = -1\cdot x^{-2} = \frac{-1}{x^2}$$

Sep 11-10:16 PM

$$\frac{d}{dx}\left(\frac{x^2\sin x}{x+1}\right) = \frac{(x+1)\left[x^2\cos x + 2x\sin x\right] - x^2\sin x\cdot 1}{(x+1)^2}$$

Sep 16-10:02 AM

Find an equation for the line tangent to the curve $y = \frac{x^2+3}{2x}$ at x=1

$y = \frac{1+3}{2} = 2$

$$y' = \frac{2x\cdot 2x - (x^2+3)\cdot 2}{(2x)^2}\Bigg|_{x=1} = \frac{4-8}{4} = -1$$

slope of tan

$$y = -1(x-1)+2$$

Sep 11-10:17 PM

Example 9 p 123

T Y

Orange grove 200 Trees Yield: 15 $\frac{bu}{tree}$

Production = $P = T\cdot Y$

$T' = 15$ new trees per year

$Y' = 1.2$ more bushels per tree per year

what is $P' = TY' + YT'$

current year: $= 200\cdot 1.2 + 15\cdot 15$

$= 200\text{ trees}\ 1.2\ \frac{bu}{tree\ yr} + 15\ \frac{bu}{tree}\ \frac{tree}{yr}$

$= 465\ bu/yr$

new bushels

Sep 11-10:19 PM